

BULLETIN No. 11.

ABAN SĒNKĒKĀ NHOMA A ETOSO DUBIAKŌ.

(For Local distribution only.)

(Ma oman yi nko ara.)

Department of Agriculture, Gold Coast.

Kua Adwumabea Wo Sika Mpoano.



**COCOA DISEASES PRESCRIBED BY THE
PLANTS (INJURIOUS PESTS) ORDINANCE.**

**KOKŌ NYAREWA SĒNEA MMOABŌNE
A ESEE NUA HŌ MARA KYERE.**

BY

R. H. BUNTING, F.L.S.,

Assistant Director of Agriculture for Research and Mycologist.

A Aban Akuafohene Abadiakyiri a Ope Afifide Nyarewa Hō

Nsem Mū Akwan Kyereve.

Accra, }
Nkran, }

Ap



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(as on Feb. 1st, 1927).

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*A Aban Aƙuafohene Abadiakyiri a Ope Afifide Nyarewa HŌ
Nsem Mũ Aƙwañ Kyerewe.*

*Accra, } April, 1927.
Nkran, }*

FOREWORD.

NNIANIM.

It is hoped that this Bulletin will be found of great value to farmers and others interested in the welfare of the Cocoa industry in the Gold Coast.

2. The colour illustrations have been prepared by Mr. Bunting, Assistant Director of Agriculture for Research, and are technically accurate and of high intrinsic value. The blocks and prints were made by Messrs. John Swain and Sons, Ltd., of London, E.C.

3. For the Twi translation the Department of Agriculture is indebted to Mr. C. E. Clerk of Christiansborg. The Twi manuscript was revised by Mr. J. S. Martinson, Assistant Superintendent of Agriculture.

G. G. AUCHINLECK,
Ag. Director of Agriculture.

May 10th, 1927.

Yɛ́n anidaso sɛ sã Abań Sɛńkêkã ńhoma yi hõ bɛ́ba mfaso kɛsɛ amã Akuafo nè wɔń a wɔpɛ kokõ adwũma yiyedi wɔ Sika Mpoano no.

2. Owura Bunting Aban Akuafohene Abadiakyiri a opɛ affide nyarewa hõ nsem mũ akwan no na osiesee mfonini a wɔakã no aduru no, na nsa anodwũma no hõ nni asem na efata. Tintimnua nè ne tintim nso yɛ Awuranom John Swain nè ne Mma a wofi London na eyɛɛ.
3. Nea ɛfa Twi ńkyerase yi hõ nso Aban Akuadwumabea no da Owura C. E. Clerk a ofi Osu no ase pĩ. Twi nsa kyerɛw no nso Owura J. S. Martinson Aban Akuadwumafwɛfo boafɔ no na ɔhyehyɛɛ.

G. G. Auchinleck
ABAN AKUAFOHENE NSIANA'NM'.

May 10, 1927.

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COCOA DISEASES MEAN LOSS OF MONEY.

KOKO NYAREWA KYERE SIKA YERA.

1. Every year a very large amount of money which should belong to the farmer of this country is lost because a big proportion of his crop is destroyed by disease. No thief, or gang of thieves, could so effectively take from the farmer his wealth as do the numerous cocoa diseases that are well organised for that purpose and which appear to be increasing in quantity every season.

1. Dā afrihyia sika keṣe a ankā ɛha akuafo benyā no mu fā keṣe pa ara se wɔ nyarewa nti. Owifo anā awifo kuw bi ara nntumi mmegye okuafo nsam ahōnyāde seneā kokō nyarewa dodow no ayi anim ye no, na ɛye se ekɔ so dā mmoroso wɔ kokō bebre biara mu.

2. If this is so it is only right that the Government should be anxious about the cocoa industry.

2. Se ɛte sāa ɛn'de eye se Abaŋ ani kũ adwuma yi hõ.

3. It may be asked what does it matter if cocoa diseases do increase seeing that we know that the quantity of cocoa for sale has every year been greater than that of the year before?

3. Wo bebisa se, se kokō dodow a wɔton afe biara mu no kɔ so dā seēn afe a etwāam' no a, ɛn'de ɛhõ nyarewa fa hõ deŋ?

4. The answer to that question is—If cocoa diseases are increasing on any tree the amount of cocoa produced by that tree must be decreasing, which means that every year the amount of money received for cocoa-beans must become smaller and still smaller than it should be.

4. Sā asemmisa yi hõ mmuae ne se, se kokō hõ nyarewa yi kɔso dua biara so a, kokō dodow a ɛse se sā dua no sow no so behūan, na ɛkyere se dā afe sika dodow a wonyā wɔ kokō aba no hõ no ɛso behūan korā a ɛrenko anim.

5. Many farmers now complain that their trees are not yielding so much cocoa as they once did. Europeans who revisit the country after a number of years speak of the increased amount of disease they find now.

5. Akuafo pī di nkɔmɔ se kokō nnua no nnsow pī seneā kaŋ no ɛsow no.

Abrofo a wɔabetrā asase yi so peŋ no, se mfe bi akyi wosan beŋra ha bio a, wɔkā se nyarewa a wo hũ no adɔso afei.

6. Apart from the devastating effect on cocoa cultivation which must follow the deforestation that has been going on for years

an increasing amount of disease must be expected in a country such as this where a foreign plant like cocoa is grown in such large numbers with so little done to maintain it in good health.

6. *Osse a enam kwaebu (bebrebe) sode ba kokō adwuma yem' dā afrihyia no nkō nkā mfūaw, etwa na etwa se nyarewa pī ba wq aduaba a emfi ha, na woadua wq sa asase yi so, na wqmmq hō mōdeñ mma ennyin yiye no hō nti.*

7. Cocoa is not a native of this country, its existence here cannot be continuously maintained unless efficient attention is given to it, any more than a European can live in West Africa, or a West African in England, unless he takes special precautions against local conditions which bring him disease. Nor is a cocoa-tree like any of the crops which farmers have been accustomed to grow from time immemorial. It is a permanent crop, unlike cassava, yams or any other plant which yield their produce within a few months of planting; it occupies the same piece of ground for many years. It cannot move from the place where it was planted when the air, moisture or food in that soil is exhausted, it must starve for want of one or other of these essentials, and a starved plant means a diseased plant, diseased plants mean reduced yields, and reduced yields mean less money.

7. *Kokō mmfi asase yi so, senea ebeye na ebekye ha no gye se woma ani kū hō papāpa; yede beto Oburoni a waba Atoe Afrika ana Obibini a wakō Eniresi Abrokyiri hō, ese se ofwe né hō so yiye wo ehq mframa hō, efise wannye sa a obeyare. Kokō dua nnté se nnua a aka a efi tetete Akuafo ta dua dā afrihyia no bi. Eye dua a enyin kye, ente se bankye ana ode a wodua a asram kakra bi akyaemu ade ba no, eno de esi babi a edi mfe pī, se fakō a woduae hq mframa, fonwini anā emu srade sã na dua no annya sã nneema titiriw yi bi a, eto apē na eye grow a ekyerē se dua no yare; dua yarefo yi kyerē nnobae so hūan na nnobae so hūan de sika ketewa ba.*

8. There would be very little to fear from cocoa diseases if farmers would realise: (1) that a cultivated, foreign, permanent crop like cocoa is not like a wild, native, forest tree which can look after its own interest, nor like an annual crop which has only a short life, and (2) that it must have suitable cultivation and conditions to maintain it in good health and yielding capacity.

8. *Se akuafo no behū nea edidi so yi a, en'de osuro kakra bēba kokō nyarewa no hō, ene se:—1) Dua a woahye nsa atew, na esi ho da se kokō no de ennte se eha kwaem' dua a eno ara nyin kwa, nanso ennte se nnobae a wonya dā afe na enkye na asa. 2) Ese se enya ofwe pa na anya ahooden asow pi.*

9. It is because the farmer does not take sufficient care of his cocoa trees that the Government introduced the Plants (Injurious Pests) Ordinance, and put into practice in 1925 the scheme whereby cocoa-farms might be cleared of disease. In each Province of the Colony and Ashanti, European Officers who know how to treat diseased trees took gangs of labourers into farms, invited the cocoa farmers to assist them, in some cases going so far as to pay the owners for the work they did on their own farms, and they treated all the diseases they found on those farms. But it was found that the farms had been so neglected that it would take too long to deal with the whole of the cocoa area within a reasonable period of time, and that, whilst some districts would thus be benefited, the big majority of farms would have to be left to the ravages of disease for many years to come.

9. Esiane sɛ okuafo no nɛnwɛ ne kokɔ nnua so yiye nti na Aban ahyɛ kokɔ yare a esɛ afide hɔ mra wo afe 1925 mu de Kyɛ sɛnea ebeyɛ na oyare befi kokɔ mfuw no mu. Asase yi so Amansin horow yi mu bi ara nɛ Asante nhina Abrofo Adwumayefo a wonim sɛnea wosi sa nnua ayarefo yi yare no faa apɔfo kuw kɔ mfuw no mu, wɔfrefree kokɔ akuafo no sɛ wɔmoa wɔn, mpo etɔ dabi a wotua akuafo a woyɛ wɔn ankasa afum adwuma no ka wɔ ɔboa a wɔboa wɔn no hɔ nti, na wosaa nyarewa a wohui wɔ mfuw no so no nhina. Na wohui sɛ wɔnnwɛ mfuw no kyea korɔ, nanso ebekye ansa na woatumi ayɛ kokɔ dodow a wobehɔ wɔ fɔkɔ ana mmeae horow a wodua hɔ nhina hɔ adwuma wɔ bre a esɛ mu, na bre a oman no bi beɔyɔ eyi ye mu mfaso no na emu fa kɛse ara de wobegyaw ato hɔ na oyare no asɛe no wɔ mfe bi a ebɛba no mu.

10. The only way to overcome such unfair treatment is for the Inspectors of Plants to visit each district and, as there is not sufficient time to treat each farm in that district, to call all neighbouring cocoa growers to a central farm, and there to show them how to deal with their trees to bring them into a condition of good health, so that they may produce as much cocoa as is possible.

10. Okwan a wɔbɛfa so ama wɔn nhina anyɔ ofwe yim' mfaso ne sɛ Afide so Afwefo no bɛsrasra Amansin biara mu na esian'e sɛ worennya hɔ kwan nkɔ afuw biara mu no wɔ mansin biako mu nsa ayare no nti, nea woyɛ ne sɛ wohyia akuafo a wɔn mfuw bemmen hɔ no nhina ba afuw biako mu na okyerɛ wɔn sɛnea wonyɛ wɔn kokɔ nnua no mfa na anya ahɔden asow yiye sɛnea esɛ.

11. The work will necessarily cost a great deal of money, but the Government feels that the importance of the cocoa industry to the inhabitants of this country is so great that the expenditure is justified in an attempt to save the trees which produce so much wealth.

11. Sa adwuma yi begye sika pi, na Aban nim sɛ mfaso kɛse a asase yi so fo nya fi kokɔ adwumayem' nti sɛ wɔfwere sika de gye nnua a ede ahɔnyade pi ba no nkwa a efata.

12. But this work will be useless ; the money will be spent in vain, and the important industry will be placed in jeopardy if the farmers, after having been shown how to treat their wealth-producing trees, neglect to put such demonstration into practice. And it will be necessary for the sake of the industry that the Government punish the negligent farmer.

12. Nanso sɛ wɔkyerɛ akuafo no kwan a womfa so twɛ nnua a ɛde ahɔnyade ba yi, na woamfa akyerɛkyerɛ yi annye wɔn asɔ so asɛm anni so a, dɔwuma yi ne emu sika sɛ yi beye humu na ama kokɔ adwuma a ɛhɔ hia yi asɛ. Kokɔ adwuma yi nti etwa na etwa sɛ Aban twɛ Okuafo a ɔnwɛ n'afuw so no asɔ.

13. In all civilised countries there are laws in force to compel farmers to treat by a given method crops which are attacked by disease. Punishment for neglecting to do so is sufficiently severe to ensure the work being done.

13. Anibue aman nhina mu wɔahyehye mra a wonam so hye Akuafo no kyere wɔn kwan a wɔfa so bɔ afɛde hɔ nyarewa ano. Asɔtwɛ a ebata hɔ a wonam so twɛ wɔn a wɔanni mara no so asɔ no mu ye dɛn ara gyeɛn, sɛnea ɛbeyɛ na wɔbeyɛ adwuma no yiye.

14. Such laws are necessary, because, although a farmer may do what he likes with his own crops, he may not let them spoil his neighbours' crops by giving them disease.

14. Sa mra no hɔ liɛ efise okuafo tumi ye sɛnea ɔpe wo nafɛde hɔ nanso ɛnɛ sɛ ɔma nafɛde hɔ nyarewa no san ne yɔnkɔ de.

15. Plant diseases spread from tree to tree, from pod to pod, with as much ease as human diseases do from one person to another, and one cocoa farm that bears disease is consequently a very grave danger to the farms around it. There can be no question that, in this country, as in all other countries, the negligent owner who allows his farm to develop disease, after being told what he must do to combat that disease, should be punished severely for the danger he is causing to his neighbours, and to the valuable industry upon which the wealth of the country is based.

15. Senea oyare di nsan wɔ nnipa hɔ no saara nso na etumi ba nnua nɛ aba hɔ, na kokɔ afuw a oyare aba mu no, ɛde amane kɛse aba mfuw a atwa hɔ ahyia no so. Eɛda ho faɛn sɛ senea woyɛ no nsase foforo so no saara na wɔbeyɛ wɔ ha, ɛne sɛ afuw wura biara a ɔnwɛ n'afuw so yiye na ɔma nyarewa ba mu bre a wɔakyerɛ no kwan a ɔbɛfa so abo nyarewa yi ano no wɔtwɛ n'aso yiye efise ode amane kɛse aba ne mfɛfo ne adwuma a ɛsom bo a asase yi ahɔnyade gyina so no so.

16. For many years the Department of Agriculture has been trying to convince cocoa-farmers of the necessity of looking after their farms and of the grave danger of allowing diseases to be untreated.

16. Mfrihyia pī ni Kuadwumayebea no mu fo abo mōden sē wō kyere kokō akuafo no hīa a chīa sē wōfwe wōn mfuw no so yiye, na wokyerē wōn amane kēse a sē woansa kokō hō nyarewa yi a ebefim' aba nso.

17. Some Amanhin and a few farmers have been able to grasp the truth of the advice given, but in many cases farmers, who were told all about how to treat their trees and the real necessity of so doing, have pleaded ignorance when on a later visit it was found that they had done nothing.

17. Amanhene nē Akuafo no mu kakra bi aso afotu yim' dennen na ēta ba sē sē wokyerē Akuafo no senea wōnyē wōn kokō nnua no mfa ne nea enti a esē sē wōyē sā no a wōkã sē wonnim, na ēye kakra na wōkōsra wōn mfuw no a wohu sē wonnyēe ho fwe e.

18. To make sure that such ignorance does not continue, the Department of Agriculture has prepared this book for wide-spread distribution to show what the prescribed cocoa diseases look like, and telling the reader how to treat them.

18. Senea ebeyē na onim a wonnim yi reñkoso da nti Kuadwumayebea fo asiesie sa nhoma ketewa yi ama asō wōn nhina so ama wōahū senea oyare no nkyerekyerem' te na wōfa so kyere okenkanfo no okwan a wōmfa so nsa oyare no.

19. The diseases with which the Ordinance is concerned are as follows :—

<i>Injurious Pests.</i>	<i>Prescribed Treatment.</i>
A.—Black Pod Mealy Pod Pod Rot	{ All pods which are not utilised for crop shall be removed from the trees.
B.—Stem Canker ...	{ Excision of diseased material and the immediate destruction thereof by fire and the treatment of the wound with hot tar.
C.—Collar Crack White Root Disease Brown Root Disease Collar Rot	{ Digging out the entire plant, its immediate destruction by fire and the isolation of the affected area by a trench not less than two feet deep.

D.—White Thread
Horse-Hair Blight
Loranthus Parasitic
on Cocoa
Orchids found on
Cocoa

Removal and immediate destruction
by fire of the pests and the
damaged portions of the plant.

A.—1. Abayare tuntum
2. Abayare fitā
3. Aba a aprow

A.—Aba a ehō nni mfaso wōm-
mfa mfra nnōbae mu no
ešesē wōtew fi dua no hō.

B.—Dutañ hō ntrutrui ...

B.—Twa oyare no fi hō fa ogya
hyew na fa amā (Kōta)
hyew-hyew kā so.

C.—Dua ase mpāpae
Ntini yare fitā
Dua ase prow
Ntini yare dodowe

C.—Tu dutañ no nhina hyew
ntēm so, na twā okā kōntōn-
kroñ anamon abien hyia
fākō hō.

D.—Asawa ana hama fitā
Hama tuntum yare
Nyankonuru (Krāmpā)
Ahum-ne-aham

D.—Twaneā oyare nō asege hō no
kyene nafa ogya hyew
nyarewabone yi nhina.

“Wogugoru woba kuru hō a etwa ne nan.”

BLACK-POD DISEASE



early stage



later stage

POD DISEASES.

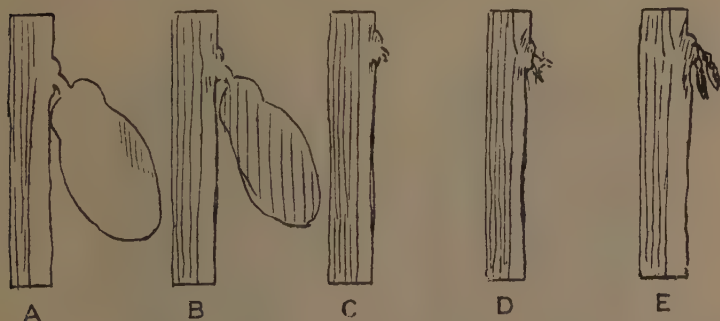
ABA NYAREWA.

20. There are three pod diseases which the Ordinance prohibits because they are responsible for spoiling a large amount of cocoa every season which should be converted into money. Each of these diseases has peculiarities of its own, but as the treatment for them all is the same we will consider them together.

20. Aba nyarewa yi nam ahrow 3 a mra no siw kwan, efise sa nyarewa yi na esese kokō kese a esese wonya da kokōye bre mu a ede sika ba no. Esōnō sa nyarewa yi biara su na esiane se okwan a wofa so sa ne nhina yare no ye biako nti yeghebogo ne nhina mü asusuw.

21. They each begin to show their presence by changing some small portion of the pod to a brown colour, as is shown in the pictures of Black Pod disease and of Mealy Pod disease (Plates 1 & 2). It is at this early stage that they should be removed from the tree because the mould which causes them very quickly produces disease-seeds which are capable of giving the disease to healthy pods, moreover in the case of the Black Pod disease the fungus is liable to get into the bark of the tree from the pod, and so spoil next season's crop.

21. Emu biara kyerē senea eyee na ebae, ene se aba no fā babi dow kō senea wohū wō aba tuntum no nè aba yare fita no mfonini mu a ekyerē senea nyarewa no te no (Mfonini 1 and 2) Sā mfiase bre yim pē na esē se wotew aba no fi nnua no so efise oyare no na eyee kokō no sa na esow oyare aba ntem na emā oyare no san aba pa no. Ede refa aba tuntum yare hō no etumi fa aba no mu hyēn dubonā no mu a enam so see afedan aba a ebesow no nhina.



22. If we cut through a pod that has just been attacked by the Black Pod disease we shall find only a small portion spoilt as is shown in the above drawing marked A. If we leave the pod on the tree, the disease will soon spoil the whole of the pod and get into the bark as in B. There it will remain after the useless pod has fallen as in C, and although we may get flowers forming next

season as in D, the crop which follows will be like that shown in the drawing marked E. Not only so but the disease may spread within the bark and form a canker (see plate 5) which will probably spoil the crop for many years to come.

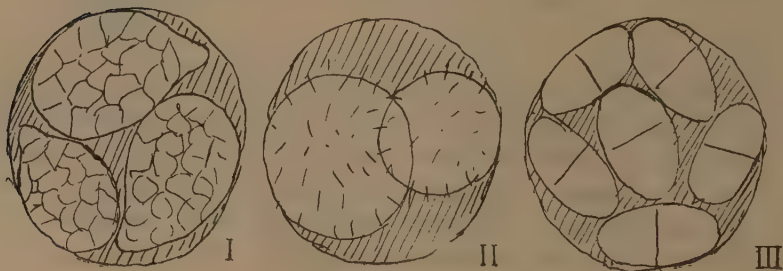
22. Sẹ yẹpae aba a ọyare tuntum yi bi aka no no mu a, yebehũ sẹ emu fā ketewā bi na asẹ senea ẹte wọ nsa mfonini "A" a edi soro no mu no. Sẹ yegyaw aba no wọ dua no so a ọyare no bẹsẹ aba mu no ñhina ntem na asan dubonā no senea ẹte wọ nsa mfonini "B" mu no. Ewọ họ saara bre a aba a asẹ no atew ato fam no senea "C" kyerẹ no, ewom sẹ ebegu ñfwireñ ama afedan kokō no de senea "D" kyerẹ no, nanso aba a efi mu ba no te sẹ nea wakyerẹ wọ nsa mfonini "E" mu no. Ennye sã nkō na mmom oyare no bẹfwete ako dubonā no mu ama aturuturuw (fwe mfonini pon 5) na asẹ aba no mfe pī ak yi.

23. The brown discoloration of the pod rapidly increases in size until the whole of the pod is changed from its healthy colour to brown and later to a black, dried up, useless pod whose existence indicates that the farm owner is a foolish or ignorant person.

23. Aba no dodowe no kọso yerew kosi sẹ aba a ẹte apow no mu no ñhina bẹsakra adow kọ na akyiri no adañ tuntum na atwintwam a ghō nni mfaso na ẹba sa a ẹkyerẹ sẹ afuw wura no yẹ ọkwasea anā obi a onni adwene.

24. The mildews which give these diseases to cocoa pods are very small plants similar to those that grow on food, corn cobs, and many other materials that are left lying about in the shade. They produce a very large quantity of seeds that are so small they cannot be seen unless a number of them are together. The full stop which the printer has used on this page is not a big object, but if we cover it with spores of the three pod diseases and look at it through a microscope we should find that the disease seeds look like this drawing :—

24. Ade a sa nyarewa no de ba kokō aba no so no yẹ affide ñketeñkete a ẹte sẹ ntuw a efi aduan, abuwor, ne neema oforo pī a wogyaw gu fonwini mu so no. Esow aba pī a esuswae na ẹdọso wonhũ gyē sẹ pī no ara gu fākō. Osiwiei a nhoma tintimfo de asi kratafa yi so no nnye ade a ẹsō, na sẹ yẹde nneema ñketeñkete a aba nyarewa abiesa fim' ba no sisi so na yẹde kyikyī fwe a yehũ se aba a ẹyare no te sẹ sa nsa mfonini yi.



MEALY-POD DISEASE



POD ROT



25. There would be at least :—

I.—On the Black Pod disease “ full stop ” three fungous fruits containing from 15 to 30 disease-seeds each ;

II.—On the Mealy Pod disease “ full stop ” two disease-seeds; and

III.—On the Pod Rot “ full stop ” six disease-seeds.

25. Nea eḡbeyē ara ne sē :—

I.—Aba tuntum siw̄iei so no ntuw no aba abiesa biara kura oyare aba fi 15 kosi.30.

II.—Aba yare fitā siw̄iei so no oyare aba 2 na eḡwō so.

III.—Aba a eḡrow siw̄iei no oyare aba 6 na eḡwō so.

26. Think how many full stops it would take to cover a cocoa-pod, and how many disease-seeds are required to cover each full stop on that pod, and then remember that the disease-seeds are piled up on the pod, not lying flat as they are shown above, and you will get some idea of the enormous number produced by any one pod that is diseased.

26. Dweñ osiwiēi dodow a eḡḡkata kokō aba hō ne aba a eḡyare yare-dodowe a eḡḡkata osiwiēi biara hō na afei kae sē aba nketeṅkete a eḡyare yare yi aboa wōñ hō ano kuw wō kokō aba mūa bakō so eṁmfiemfām so sēnea wohū wo mfonini a eḡwō soro no mu na eḡḡkyerē wo dodow kō a eḡwō kokō aba a eḡyare hō.

27. Go into your farm in the early morning and you will find that pods suffering from black pod disease are coated by mildew, that those attacked by the Mealy Pod disease are covered with masses of white or pink meal, each grain of which is a disease-seed, and that all the cases of Pod Rot are surrounded by a thick layer of black dust which consists entirely of disease-seeds. Now consider that, when those disease-seeds are blown away by the breeze, washed off by rain, carried away by insects or animals, the mildew within the diseased pod will produce just as many again, and you will agree that pod diseases at any rate are well organised to steal produce from the farmer.

27. Kō wafūm anḡpahema na wo behū sē kokō aba tuntum a eḡyare yi ayē no sēnea agye ntuw, na nea abayare fitā ayē no nso bribi a eṭe sē aduan fitā a eḡdañ yē kokō sē pī ahura hō, na aba a aprow no bribi pipri a eṭe sē mfutuma ahura hō a ne nhina kura eḡyare aba, na eḡba sā a en'de aba a eḡwo kokō no mu nhina yare anā asē. Afei fa hō adwene sē sē mframa bḡ aba a ayare ana asē, sē nso osu tḡ na egu fam a mmoamoa tḡwe kḡ na ntuw a ahura kokō aba a eḡyare yi hō no bēma toforo aba bio, na wobḡete ase sē kokō aba a eḡyare anase asē yi ḡkwañ biara so no asiesie ne hō sē eḡbegye okuafo nsam ne nnobae nhina.

28. Each disease-seed produced on a pod is capable of causing disease to healthy pods. If you wish to test whether this statement is true, make a small wound in a healthy, nearly ripe pod and place on the wound the smallest possible quantity of the growth you find on a mealy pod, and see what happens in a day or two.

28. Aba a eyare biara a ewo kokō aba mu tumi ma nea ete apow no nhina yare. Sē wo pē sē wo hū senea mekā yi yē nokware a, fuaw aba hōdenfo a agyigye biako hō kakra, na fa aba yare fita a ete sē aduañ no bi ka anim na dakro ana nnanu akyi wo behū senea ebēba.

29. There was once a farmer who had three pods growing near one another on a cocoa tree, and one, like that one at the top of Plate 3 became diseased. It was not a large spot of disease, and the pod was not quite ripe, so the farmer did not take the trouble to cut it off. But that spot grew until in a day or two the whole pod was discoloured and the disease had travelled to the healthy pod that was touching it; moreover the pod growing underneath was soon attacked by disease-seeds carried from the ones above it. So that a little later, when the farmer went to see whether the pods were ready to cut, he found three black pods that were useless to anyone. If he had been a wise man instead of a tired and ignorant fellow he would have cut off that first pod when he saw the first sign of disease, and the chances are on his next visit he would have found two healthy pods together like those at the bottom of the picture.

29. Bere bim' okuafo bi wo kokō dua a aba abiesa tuatua so a ne nhina bobo hō na emu biako te sē nea ewo mfonini pon 3 no sro no a ase ana ayare. Fākō a oyare no wō no nsō pī bi na esiane sē kokō no nwiei bre nti okuafo no anhaw ne ho antwa ankyenē. Enna sã fã no terewe na dakro anã nnānu akyi no kokō aba no nhina su sakrae, na esiane sē nea ete apow no beñ nea eyare no nti esann no bio, nso aba a esensen ase no nea etuatua soro no yare-aba no saññ nea ewo ase no. Mmere tia bi akyi no okuafo no kofwe sē aba no abre ana na watew na ohūū aba tuntum 3 a ne nhina hō nni mfaso. Sē oye onyansāfo na onnye okwasea a wabrē a, ankā bere a ohūi sē aba a edi kan no sē rededa akwañ no otwaa sã aba no kyenee na nea ebēba ne sē ne nsra fwe a edi kan no mu no obehū aba abien a ete apow te sē nea ewo mfonini no ase ho no.

30. It is because the Government knows that (1) pod diseases are caused by moulds, (2) these moulds produce innumerable seed, and that (3) each of these seeds is capable of giving disease to healthy pods, that the treatment prescribed for pod diseases is to cut off from the tree all pods that are not used for harvesting and to bury them in the soil where their seeds can do no harm, or to kill disease by burning them.

30. Esiane sē Abañ nim sē:—(1) Aba nyarewa yi ntuw na edeba nti (2) sa ntuw yim' biara tumi ma kokō aba a ete apow no yare nti okwañ a wōakyere sē wōmfa so nē sa nyarewa yi nni ne sē wōbetetew kokō no nhina a wōmmfa mfra nea wōbeton na wōahyew ana woatu amōa de ne nhina ahye fam wō fākō a aba no nntumi nse bribiara ho.

POD DISEASES



Disease spreads from pod to pod by contact, or by its seeds being carried by the breeze, falling water, or by insects.



If a diseased pod is allowed to remain on the tree it will spoil other pods.



If it is removed early the other pods have a chance to ripen.

31. But these diseases are cunning enemies, they do not necessarily depend upon the seeds they produce on the outside of the pod for their reproduction ; some of them produce inside the pod another kind of seed which has a tough, thick skin specially provided to keep that seed alive when conditions are unfavourable to its growth, or the mould may go on living long after it has killed the pod. So we must also arrange that the cocoa husks, after their contents have been removed, either be buried or burnt by fire because of the resistant disease-seeds they may contain or the seeds they may produce on their surface. Look at a heap of cocoa husks in the early morning after they have been broken and you will find mildew everywhere, and plenty of disease-seeds for the breeze, or for insects and birds, to carry to healthy pods.

31. Na sã nyarewa yi ye atãmfõ aniferefo, wommfa wõn aba a wõpae wõ kokõhonõ no akyi 'so mfẽe, ebinom pae aba fofro bi hyẽ kokõ aba no mu a sã aba no wẽre ye pẽprẽ a wõahyẽ da ayẽ sẽ wõde bẽkoro aba yi so wõ bãbi a ẽrennyã anyĩnye hõ anãasẽ ntuw no sẽ ekũru kokõ aba no po a ẽtumi nyiĩ kyẽ. Ne sã nti ẽsẽ sẽ yefwẽ na sẽ yẽbõ kokõ no wie ara pẽ a honõ no yetu amõa de hyẽm' anãasẽ yehyẽw wõ ababone a ẽhyẽm' ne nea ẽda adi no hõ no nti. Edu anõpa hẽmã a fwẽ kokõ honõ a woaboa ano na wobehũ ntuw nõ so bãbiara sẽ nso nyarewa aba a mframa huw gu na mmoammoa anã nnomã soa kõma aba a ẽte apõw no.

32. It is a danger to your own, and to your neighbours' farms to leave cocoa-husks lying about because of the disease-seed they may contain.

32. Sẽ wogyaw kokõ hono no gu woafuw so a aba a ewõm no nti ẽnyyẽ wo ùkõ na wo hũ mu amane, na wo mfẽfo mfuw a ẽbẽn wode no nso hũ amane saara.

33. It is a danger to leave pods on the tree after they have become diseased because of the disease-seeds they will produce. It is a danger to leave diseased pods on the tree because of the disease getting into the bark.

33. Sẽ wo kõkõ a akyẽn a ẽyareyare senseĩ dua so a ẽde amane ba, ẽne se ẽbẽmã ẽyare no ahyẽn dubonã no mu.

34. A wise farmer will bury husks and pods in the soil at least 9 inches deep so that disease-seed may be rendered harmless.

A wise Government should compel the negligent farmer to do the same so that his neighbour's crop may not be spoilt as well as his own.

34. Okuafo nimdefo bi ara betu amõa a emũ dõ beyẽ nsateakwã 9 de honõ no ñhinã ahyẽ mu, sene a ẽbeyẽ na na ẽyare no remfa amane mma bio. Aban anyansãfo beyẽ okuafo dwenharefo biara ama wayẽ sãara sene a ẽbeyẽ na ẽremma nẽ yõnkõ nnobae nnsee.

STEM CANKER.

DUA HŌ NTRUTRUI.

35. In cocoa-farms where conditions are very damp we can sometimes find a disease of the stem called Stem Canker. This disease first shows itself as a purplish coloured juice being squeezed out of the bark of the tree. It is nearly always found close under, or near by, an old dead cushion which once bore pods. If the weather is dry and hot, the juice dries to a pink, rusty coloured patch, but after a shower of rain, when the rest of the stem is dry, that patch will remain moist for some time.

35. Kokō mfuw a ewo nea ehō yē fokyē no eto dabi a yehū yare bi a wofre no dua hō ntrutruī wo hō. Sā yare yi nea edi kañ no ede nsukyī kōkō sé yi ne subañ adi fi dubonã no mu. Wotā hū sā yare yi wō dua a asow na wōatew wō hō peñ no aniwa ase bābi. Sē wim wó anā eyē hyew a, nsu no kyēnkyēñ fa su potō kō séwō fākō hō na sē osu gu wīe a bre a dua no hō ñhinā awo no, fākō hō yē fokyē kyē.

36. The bark underneath this patch soon dies and cracks, and in bad cases pieces of the dead bark fall out and show the wood underneath to be discoloured by a purplish stain (as in the bottom picture of Plate 4). If conditions are favourable to the disease it spreads to a bigger area and causes a lot of damage.

36. Dubonã a ewo beae yi ase no wu na epaepae, na sē aseē pī a nasiñasiñ no totō na eyi dua a ehye ase no adi fāññ sē ñkekāe kōkō bi akekā mu senea yehū wō mfonini pōñ 4 a ewo ase yi mu no. Sē ehō gye oyare no de a emu terew anā emu yerew ne ema ade pī sē.

37. The bark of a cocoa tree is more important to that tree than skin is to a man's body, because not only does it serve to protect the structure inside but it also contains the veins which convey the tree's blood wherever it is wanted. So that if the bark of the stem is badly injured and does not heal quickly the roots cannot get sufficient of the blood of the tree which is manufactured in the leaves, to keep up their growth, and if they cannot grow they cannot drink in enough food from the soil to nourish the tree properly, and the result must necessarily be a smaller number of pods. Not only so but, as we saw in the case of the black-pod disease, we cannot expect to find pods on cushions killed by canker.

37. Kokō dubonã no ho hīa dua no señ senea onipa were hō hīa mā no, efise ennye sē ebō dua no hō bañ nkō, na mmom esañ kura ntinī a etwe dua no mu nsu kō babiara a ehīa sē nsu no kō. Enti sē dua no hō boñ ba kām pī na añkoro amfa so ntem a en'de dua no ntini ntumi ntwetwē nsu a efi ñhabañ no mu no ma entumi nnyin, na sē nnua no annyā anyinye a en'de enntumi nnyā asase no mu srade senea ese mmfa nyen dua no yiye na ebēba sē ebēsow aba ñketewa bi.

Ennye eyi nkō na senea yehū wō abayare tuntum hō no gremma sē aniwa dedaw a ntrutruī no akum no no besow aba.

STEM CANKER



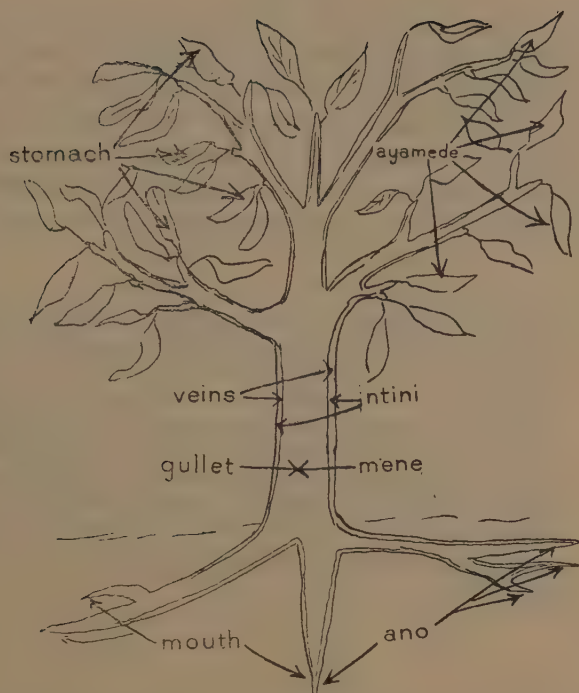
early stage



later stage

CANKER CAUSED BY BLACK POD DISEASE





38. The mould which causes stem canker is the same one which causes black-pod disease. The roots of the mould get into the stalk of the diseased pod and if the weather is wet the bark around the cushion is killed and the mould-roots go on growing until a large area of the bark is dead and useless. If the diseased pod were removed before the mould had travelled into the bark there would be no canker. Look at the cocoa pod on Plate 5 ; if we leave it on the tree it will soon become rotten and will probably give rise to a canker as is shown on the left-hand side, but if we cut it off as soon as it is found there is every hope of getting a crop next season, as is shown on the right-hand side of the picture.

38. Ntuw a ɛde dutan ntrutrui ba no ɛno ara ɛde aba yare-tuntum no ba. Ntuw no ntini hyɛn abã a kokõ yarefo no tuasonomuna semframa no ye fokye a ekũm bõn a ɛkata aniwa no hõ no, kɔso nyiũ kosi sɛ bõn no fã kɛse paara wu a mfaso bi nni hõ. Sɛ woyii aba yarefo no hɔ ansã na ntuw no hyɛn bõn no mu a ntrutrui mma. Fwɛ kokõ aba a ɛwɔ mfonini põn 5 so no, sɛ yegyaw wɔ dua no so a ɛrenkyɛ na ɛbɛprow, na ampara dua ntrutrui yara ba sɛnea ɛte wɔ mfonini no beĩkũm so no, na sɛ yehũ pɛ na yetwã a anidaso wɔhɔ sɛ yebenyã nnobae pĩ wo kokõ bɛbre a edi so ño mu, sɛnea ɛte wɔ mfonini no nifã so no.

39. The Ordinance tells us that to treat cases of stem-canker we must cut out the diseased material and paint the wound so made with hot tar. That means that we must keep on cutting away the bark until the cuts reach healthy bark which will have a chance

to grow over and heal the wound. Hot tar is painted on to the wood to keep out insects and other moulds until the bark has grown over it. Canker is something like an abscess which cannot be cured until all the diseased matter has been removed. And because the diseased bark of canker contains the roots of the mildew and can produce disease seeds, the Ordinance says it should be burnt directly it is cut off so as not to allow the seed to cause disease on healthy pods or stem.

39. Mra no kyere yeñ se dua ntrutui yaresa ne sé yetwa nea oyare no wo hõ no kyenẽ na yede amã hyewhyew kã ho. Eno kyere se ese se yekoso twa bõñ no kosi se ebeto bõñ a ete apow no na anyã okwan akoro afa so na asa yare no. Wode amã (Kõtã) hyewhyew no ka dua hõ de apam mmoam-moã nè oyare fofro a ekã hõ no kosi se bõñ no bekro afa so. Etõ dabi a dua ntrutui yare no te se pompõ mu nsu a wonntumi nnsa gyẽse woyi nsubone yi nhinã ho. Esiane se dua ntrutui no bonã no kura oyare ntini a epae yare no nti Mra no kyere se wotwa pe a ese se wohyew senea ebeyẽ na aba no mu yare no rensañ aba anã dua hõõdeñfo a aka no.
-

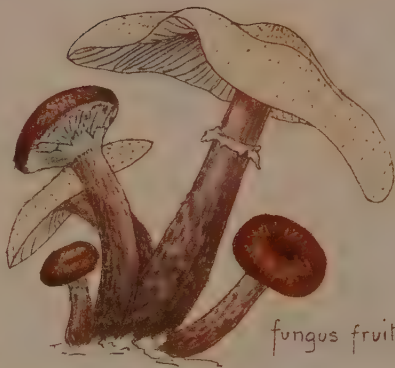
COLLAR CRACK OF COCOA



section through stem
showing cracks filled
by the fungus.



cocoa stem showing cracks
with protruding fungus and its fruits



fungus fruits

ROOT DISEASES.

NTINI AYARE.

1. There are four diseases, which attack the roots of cocoa trees, given in the Ordinance; they are Collar Crack, White Root disease, Brown Root disease and Collar Rot. Although, as we shall see, they differ from one another in appearance, their effect on the tree is the same. They kill the roots, and because a tree cannot live unless its roots are continuously taking in food from the soil, any more than a man could exist without a mouth to eat food, the whole tree must die. Death may be rapid or it may take some time, but it is bound to happen sooner or later. First we find the leaves wither and hang down, and then when they have died from loss of food the branches and stem also die. Now, when we notice a cocoa tree with its leaves hanging down as if they were tired of life, it is wise to examine the base of the tree and if we find nothing wrong there, to take away the soil from its roots and to see if there is anything the matter with them. If the roots are diseased it is better to dig up the tree entirely and to burn it rather than to leave it, because by burning it we shall kill the disease which otherwise would spread to neighbouring trees.

1. Ayare hrow anañ na eyē kokō nnua no ntini senea wokyere wō Mra no mu no ɛne; Dua ase mpāpāe (Collar Crack) Ntini yare fitā (White Root disease) Ntini yare dodowē (Brown Root disease) Dua ase prōwē (Collar Rot). Ne nhinā sonsonōe senea yehū no de nanso ade a eyē no nnua ho no sē. Wokūm ntini no, na esiané sē dua no ntumi nnyin gyese etwētwe asase no mu srade senea ete wō onipa hō no sē, onntumi ntrā ase gyēsē onyā ano de didi no ara pē, etwa sē dutān no nhina wu ntem anā sē ekye kakra nanso eyē kakra a otwa na etwa sē ewu. Nea edī kañ no yehū sē nhabañ no akagyaw na esensen hō na akyiri no sē aba no nnyā ade a ebeyēñ no a dutān no nso wu. Afei sē yehū sē kokō nhabañ senseñ hō na eyē sē grehodwōw anā erepo a, nyansā kwañ a yēbēfa so ne sē yefēfē dua no ase fwe, na sē yēñhū sē bribi adi bone wo hō a yeyi ntini no so dote no na yēfwe se ehō akā ana? Sē ntini no ayare anāsē bribi ayē ntini no a eye sē yetu dua no korā na yehyew naense sē yegyaw si hō; efisē sē yehyew a yebetu yare a sē yeanye sā a ebekita nnua a akā no.

COLLAR CRACK.

DUA ASE MPAEPAE.

2. If we examine the base of a wilted tree and we find cracks extending for a short way up the stem from the soil, we shall know that the tree is suffering from the Collar Crack disease. Under the soil the roots will also be found to be cracked as is shown in Plate 6, and both stem and root may be more or less rotten, so that

if we cut them through they will fall into wedge-shaped pieces. The cracks are filled by the white body of the fungus which projects beyond the bark and forms a yellow frill that soon becomes black. The tree which has been cut through and drawn at the top of the picture shows the fungus body in the cracks, which in three cases extend to the centre of the tree and cut off two wedge-shape pieces, these will soon be rotten and useless for conveying food to the leaves or stomach of the tree.

2. Sẹ yẹfwe dua a ẹrepo ase a yebehũ mpāepae a efi dutań no ase fro kọ soro kakra ẹnna yede behũ sẹ dua ase mpāepae yare ayẹ no. Ntini a ẹwọ asāse no mu nso wobehũ sẹ apāpae senea mfonini pōń 6 no kyere no, na dutań no ntini no aprow pī anā kakrā, na sẹ yetwītẁam' a emu pāpāe ntrānrā negma fitafitā bi a efi ntuw no mu fwirew bōń no mu pue na ẹye nsensanee tесе ankāhonō a ẹńkye na edań tuntum. Dua a wọatẁam' no wode nsa ayẹ ne mfonini wọ mfonini no atifi kyere ntuw amā mre (mre) no wọ mpāpae a akwań abiesa so no ẹtoaso kosi dua no mfinimfini na ẹpae mu ntrānrā abien a ẹrenkye na aprow a mfaso nni hō, efisē entumi mfa nsu nkọ nhabań no anā dutań no yafunu mu.

3. The bark is full of the roots of the fungus and gives the appearance when cut of being filled with mildew.

3. Dua no bōń no oyare no akata hō na sẹ wutẁa na wo fwe a ẹye sẹ agye ntuw.

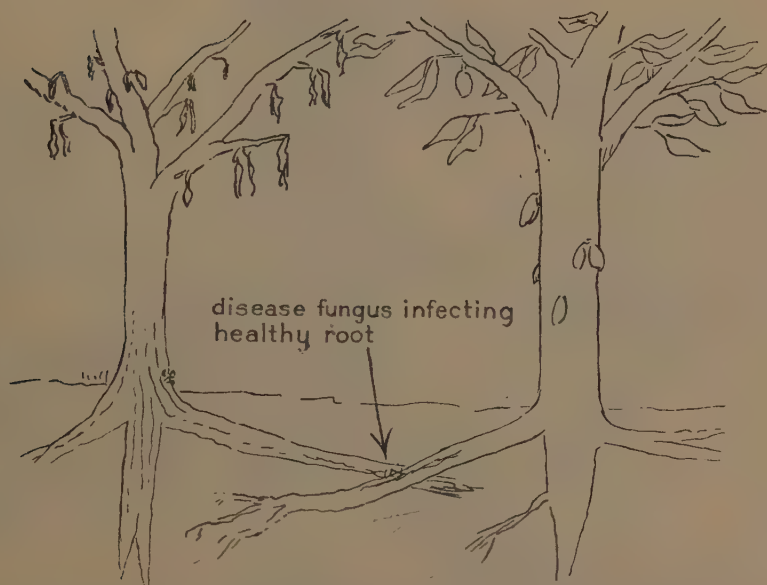
4. The fungus which causes the Collar Crack disease is a much bigger plant than the mildews that cause Pod diseases. It bears fruit, when the tree on which it grows is dead, that are like mushrooms with caps at first brown then becoming white with brown spots and brown stems; a group of the fruit are shown on Plate 6, drawn natural size. The seeds of the fungus are, however, even smaller than most of those of the Pod disease fungi; they are produced in very large numbers on the flat plates which hang under the cap.

4. Oyare a ẹmā dua ase paepae no yẹ afifide keṣe kyeń nyārewa a ekā kokō aba no. Ẹsow aba bre a dua a enyiń wọ so no awu no ẹte sẹ mrē a mfiase no ne ti adow na akyiri no ẹdan fitā a dodowe sisi mu mfonini kuw a ẹwọ mfonini pōń 6 so no kyere senea ẹte pepepe. Ẹtọ dabi a oyare no aba susūae sēn oyare a ekā kokō aba no mu pī, wobehũ aba no pī ara wo mrē no ase ẹhọ na enyiń na epae aba bebrē.

5. The fungus does not depend only upon seeds for its propagation; under certain conditions it can produce long black root-like strands which grow through the soil until they find another victim to which they cause the disease. And any old piece of wood or bark which contains some portion of the fungus body may

reproduce the disease when the material comes into contact with a living root.

5. Oyare no ennye aba no ñkõ so na enam so fee, okwan bi so no etumi yi adi se hama tuntum tãã a ete se ntini a enyin hyen dote mu kosi se ebenyã bribi akyere no de yare no asan no. Na dufunũ anã dubõnã wui biara a oyare yi wõ hõ no, se ene ntini mõmõnõ hyia a etumi ma oyare no san no.



6. Probably the commonest method in this country, by which the fungus increases the number of cases of Collar Crack disease, is by growing along the root of a diseased tree until that root comes into contact with the healthy one of another tree, and the fungus hungry for the new food thus offered grows into and along the root of the healthy tree. So that in a short time a number of trees around the original case are found to be withering and dying.

6. Ebia okwan a oyare no tã fa so ma dua ase mpãpae yare dõsõ asase yi so ne se enyin wõ dua bi a eyare hõ kosi se sa ntini no nè dua a ete apow ntini hyia, na esiane se oyare no fwefwe anyinye nti etenẽ kõ dua a ete apow no ntini no hõ. Se eba sã a enkye korã na nnua pĩ a kan no ete apow no repo na worewu.

7. It must be remembered that the fungus, which causes Collar Crack of cocoa, grows on a number of bush-trees and other plants and can give the disease to cocoa trees which grow in their neighbourhood, and that the treatment prescribed for dealing with Root

disease, which we shall consider later, should also be applied to any plant which bears the conspicuous fruits of the disease-causing fungus.

7. Eṣe sẹ yekae sẹ senea oyare no mã kokō dua ase pāpae no, saara na eyẹ wuram nnua nè afifide fofro na etumi de yare no sañ kokō mma a ebemmen hõ no, okwañ a wọkyere sẹ wọnam so tu sã ntini yare no a grenkyẹ na yebesusuw hõ no eṣeṣe yede to afifide bi ara esow oyare aba a agyediñ a ẹde yare a ẹmã ntuw ba yi hõ.

WHITE ROOT DISEASE.

NTINI YARE FITĀ.

8. The next root disease of cocoa given in the Ordinance can only be denominated by looking at the roots of a tree whose foliage has withered and is dying. If we find a white or pinkish cord attached to the root, creeping along them, and spreading about at the end into a white mildew, we know the disease is the White Root disease, and that the tree is doomed to death. The cord is the body of the fungus and sends its roots, which may be too small to see, into the roots of the cocoa tree.

8. Kokō ntini yare fitā a edi so a wọkã hõ aṣem wọ Mra no mu no nea wode ẹto ne diñ ara ne sẹ wobefwẹ dua a ne ñhabañ akagyaw na ẹrewu no ntini. Sẹ yehũ hamã fitā anã kokō bi fra ntini no mu na ẹne ne ñhiña retētēnē na ẹrẹko n'awiei a ẹdañ oyare hama fitā a, yenim sẹ oyare no yẹ ntini yare fitā, sã dua no edañ ẹḍen ara a ebewu. Hama no nè oyare no ankasa na ẹdi ntini a esũa no hyen kokō dua ntini mu.

9. The cocoa-root is killed by the fungus-roots and decays, but the fungus fattened by the food it has stolen from the cocoa tree goes on living and sends the cord through the soil in search of the roots of healthy trees in order to devour them. After the roots have been killed by the fungus, the leaves and stem of the tree are quickly starved to death. It is then that the fungus produces its fruit on the dead stump just above the soil. These fruit are shown on Plate 7, and will probably be recognised by most cocoa farmers as fungi they have seen on the stumps of old bush trees on their farms. They project from the stump like small shelves, the colour of a fully ripe orange on both their top and bottom surfaces. They are handsome in appearance with their bright colour, and appear to be harmless. But their under-surface consists entirely of innumerable little holes each one of which contains a large number of disease-seeds.

9. Oyare no ntini no kũm kokō ntini na ma ewu na ẹnam nsu a ẹtẁētẁē fi kokō no mu no so nyã ahogden dọ srade na ntini no tenē wọ asase no mu fẁefẁẹ nnua a ẹte apow no ntini aṣe no. Sẹ oyare no kũm ntini no ẁie a dua no ñhabañ twintẁām na ewu. Sã bre no mu na oyare no sow

WHITE ROOT DISEASE



under surface of fungus fruit.

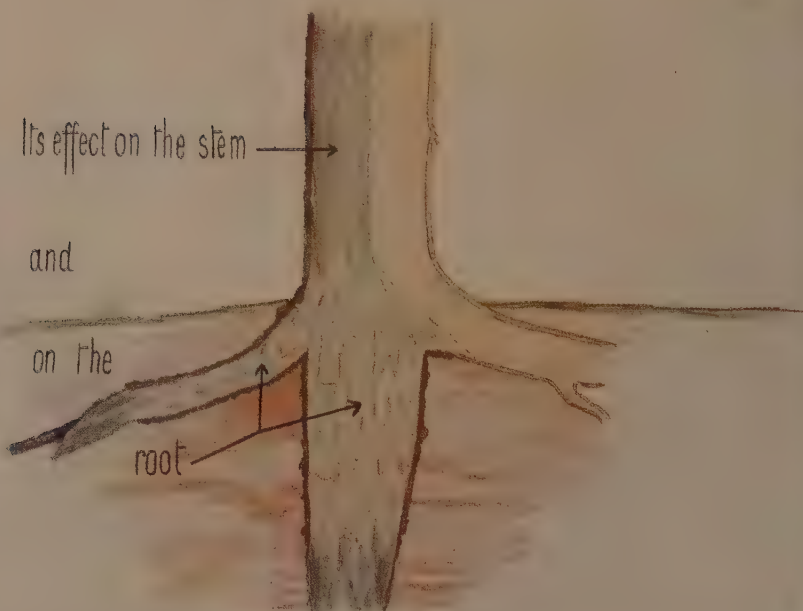
Roots of Cocoa tree attacked by cords of the WhiteRoot fungus



upper surface of fungus fruit

Roots of the same Cocoa tree killed by the fungus which is now fruiting.

BROWN ROOT DISEASE



aba wọ dunsin a awu a esi họ no so. Sā aba yi yehū wọ mfoninipōn 7 no mu na ẹne nea kokō akuafọ pī de behū sẹ ẹne oyare a wohū wọ kwae mu nnunsin a ẹwọ wọn mfuw mu hō no. Epue fi dunsin no so sẹ nworā nketenkete wọ sro nẹ ase te sẹ akutu a abere wọ natifi nẹ ase nhinā. Sẹ wofwẹ a ẹyẹ fẹ na ẹyẹ hrāhrā na ẹte senea entumi nsẹfwe. Nanso ntokuru nketenkte pī hyehye ase họ a nyarewa aba pī ahye mu mā.

10. The White Root fungus, like that of the Collar Crack disease, could manage to survive even if it never formed fruit ; any piece of diseased root contains the living fungus which can attack healthy roots, and as already explained the thread-like body of the fungus is capable of growing through the soil until it comes into touch with a healthy root along which it grows, and which it kills later on.

10. Oyare a ni ntini hoa no te sẹ dua ase mpāpae yare sẹ annsow aba po a etumi nyin ennwu, ntini sin biara a eyare no etumi san ntini hōdenfo bi ara, na senea wokyere mu dedaw no oyare hamā teā no tumi tenē fa asase mu kosi sẹ esōa dua hōdenfo no ntini na enyin fa hō a akiri no ekūm dua no.

11. The fungus lives in the roots of many of the forest trees, it has even been found on Cassava, and generally when it is found in a cocoa farm careful search will show that it has come from an old bush stump. It is therefore necessary, when treating cocoa-trees that are attacked by the White Root fungus, to destroy also any bush-trees or stumps which bear the fungus, so that it may not do any more damage.

11. Oyare no wọ kwaem' nnua pī ntini mu mpo wohū wo bankye dua ase, na se wohū wọ kokō afuw mu na wofwefwẹ mu yiye a ebekyerẹ sẹ efi wuram' dunsin dedaw bi hō. Eyi nti ehia sẹ woreye kokō nnua a oyare ntini fita no aseno no aduru a, wotutu wuram nnua anā nnunsin a ẹde yare no bae no senea ebeye na ẹrensee ade bio.

BROWN ROOT DISEASE.

NTINI YARE DODOWE.

12. Another root disease of cocoa, which cannot be named until the root is exposed to sight, is named Brown Root disease, because the fungus, which causes the tree to be diseased, consists of a brown soft material with a black hard skin in which pieces of soil and small stones become embedded. The fungus is closely attached to the skin of the root, and it very rarely appears above the soil. As it is slow in growth it may be slow in killing the tree and it is frequently found that one or two side-roots of the tree are completely rotted away before the fungus attacks the main root.

12. Kokō ntini yare fofro a wontumi nto ne din gyē sẹ ntini no ada adi fān ne Ntini yare dodowe ; efi sẹ ade a emā dua no yare no mu wọ ade dodowe betē a were tuntum bi kata hō a dote nẹ mmosea hyehyem'. Oyare no fām ntini no were hō pī na ẹntā nnyi ne hō adi wọ asase ani. Senea ẹkye

nyin no saara na ɛkyɛ ansã na ekũm dua no na notã hũ sɛ dua no ase fa, sɛ ntini a ɛwo fa biako ana abien prɔw korã ansã nã oyare no de akã ntuni kɛse no.

13. The brown body of the fungus grows along and around the root of a tree until it comes into touch with the root of another tree which is healthy, it then begins to grow on the new root and after some time completely surrounds it; it is the fungus roots which kill the cocoa-root and cause a dry-rot of the wood. As it exhausts the food supplied by that part of the cocoa-root the fungus creeps up until it reaches the main root which in its turn is killed and rotted. The drawing at the top of Plate 8 shows what the fungus body looks like, and that at the bottom shows the same tree cut down the middle, by which it may be seen that with only one side root living, only a small portion of the cocoa tree remains alive, and that will soon be starved to death when the fungus has surrounded the still living side root and rotted that also.

13. Oyare dodowe yi hɔ fa dua no ntini hɔ kosi sɛ ɛnɛ dua bi a ɛte apɔw ntini hyia ɛfra ntini fofro no mu nyin na bre bi akyi no ɛfa ntini fofro no di, ɛyɛ oyare no ntini no na ekũm Kokɔ ntini no na ɛmã dua no kyɛn na ɛprɔw na esiane sɛ ɛtwe nsu a ntini no nyã wɔ sã bea hɔ nti ɛtenɛ kɔsi kosi sɛ ɛbɛtɔ ntini kɛse no, na akũm no. Sɛ wofwe nsa mfonini no soro a wo behũ sɛnea oyare ne te. Nea ɛwɔ ase no nso yɛ dua koro no ara a wɔatwam' abien, ɛno na wode behũ sɛ ntini ketewã biako pɛ nɛ kokɔ dua no fã kakrã bi na ɛnwui ɛ, na sɛ oyare no bare ntini ketewa a ɛnwui no hɔ hyia a, kokɔ dua no kagyaw na ewu.

14. Brown Root is a bad disease, it causes the cocoa tree to die, but it is not quite so dangerous as White Root disease which can go through the soil in search of new roots and can kill a number of trees in one spot; those killed by the Brown Root fungus are usually isolated.

14. Ntini yare dodowe yɛ oyare bone a ɛmã kokɔ dua no wu eyi hɔ nnye hũ sɛ ntini yare fitã a etumi kɔ fam akyiri pɛ ntini foforo na etumi kũm nnua pɛ wɔ brea a ntini yare dodowe tã kũm nnua nkoro nkoro.

COLLAR ROT.

DUA ASE PRɔWÈ.

15. This disease is distinguished from the other root-diseases of cocoa by the fact that all the fungus body is contained inside the tree until the latter is dead and fungus fruits appear on its surface. Unlike the Collar Crack, White Root and Brown Root diseases, it has no part of the fungus body on the surface of the root.

15. Nea ɛmã esɔno sã yare yi ne kokɔ ntini yare horow a aka no ne sɛ: oyare mũ no nhina hyɛn dua no mu kosi sɛ ewu na oyare aba yi ne hɔ adi wɔ hɔ. Ennte sɛ dua ase mpapae ntini fitã nɛ dodowe yare no, eyi de oyare no nnyi ne hɔ adi wɔ ntini no so.

COLLAR ROT OF COCOA



16. The fungus which causes Collar Rot may attack either the roots or part of the stem. When it has entered the tree it slowly grows, killing the bark and wood as it increases in area. A little experience teaches a person to recognise the presence of the fungus by its effect on the wood which it kills and causes to become dry like tinder, and divided into small areas with thin black boundaries, so that if we cut through a root attacked by Collar Rot we shall see the appearance shown in the lower drawing on Plate 9.

16. Oyare a ẹde dua ase prōwē ba no ekita ntini no anā sẹ dutań no fā babi. Sẹ ẹhyen dua no mu a enyin berew na ẹremyin na ẹrekum dubonā no ne dua no. Nsusuwhō kakra bekere sẹ oyare no ade a ẹyẹ ne sẹ ekūm dua no na ẹma ẹwo dań nnyina (ogya) na emu pāpae nketeńkete a mpāpae no no yẹ tuntum na sẹ yetwa ntini no a dua ase prōwē akā no no a yebehū senea anim te senea yehu wọ nsa mfonini 9 ase ho no.

17. Sometimes only one side of the stem, or only one root is attacked, and as that part of the tree is killed and rotted, the other side of the stem and the other roots remain alive for some time. In which case only part of the foliage withers and dies. But it must be remembered that the whole will be killed ultimately although death may take some time. Soon after any part of the tree's stem is killed by Collar Rot, the fungus produces fruit on the surface of the bark; these fruits are at first small white knobs bearing on their surface innumerable numbers of very small white seed—the young fruits are shown on the right hand side of the upper drawing. When the fruit have reached maturity they contain a very large number of small vessels as is shown enlarged on the picture. These small vessels when ripe are full of disease seeds. This second kind of seeds are black and though they are much larger than the first kind that the fruits formed they are still small enough to get seven or eight on one of the printer's full-stops.

17. Ẹtọ dabi a dutań no fā bākō anā ntini bākō pẹ na oyare no kã no, na esiane sẹ sã fã no nkō na ewu anā ẹprōw nti dua no nẹ ntini no fã a aka no nyin bre kakra ara gyeńń. Sã bre no mu no ẹso nhaban no fã kakra bi pọ na ewu. Nanso ẹsesẹ yekae sẹ ẹbekyẹ kakra ǎnsǎ na dua no awu. Sẹ dua ase prōwē no kūm dutań no fã no wíe a oyare no sow aba wọ dubonā no anim sã aba yi ẹfi ase apowapow nketeńkete fitafitā, sã aba a ennyina no wo be hū wọ nsa mfonini a ẹwọ sro no nifā so. Sẹ aba no nyin a bribi nkruwa nkruwa nkete nkete fitā pī hyehyem senea yehū a wọaye no kẹse wọ mfonini no mu no. Sã nkotoku nkete nkete yi sẹ ẹbre a oyare ahyẹ no mǎ. Sã aba hrow a ẹtọ so abien yi yẹ tūmm na ẹwom sẹ ẹsosõe seń aba a edi kań no de nanso esusuae ara senea asōń anā awotwe betumi akọ atintimfo osiwiei so.

TREATMENT PRESCRIBED FOR ROOT DISEASES.

OKWAÑ A EKYERE SENE A WOSA SĀ NTINI AYARE YI.

1. The Ordinance says we should dig out the entire plant that is affected by root disease, and then destroy it by burning, and after that the ground in which it grew should be isolated by digging a trench two feet deep all round the area where disease occurred.

1. Mra no kyerę sę yentu dua a oyare no aye no mū ñhĩñā nkyenē na yeñhyew, na ęno akyi no asāse a enyin wọ so no yentu amōā a emu dọ beye anamoñ abien ntwa ofā a oyare no baa hq no hō nyhia.

2. If you remember how important the roots are to a tree you will readily understand that a disease which attacks the roots must sooner or later cause the death of the whole tree. If you will remember that a dead cocoa tree left in the ground will probably cause the death of its neighbours you will easily foresee the necessity of uprooting the diseased tree and of destroying the fungi, which cause root disease, by burning the tree.

2. Sę wo kae sęnea ntini no hō hĩa mā dua no a, wobete ase ntēm sę oyare a ękā ntini no bekūm dua no bre biara mu. Sę wo bekae sę kokō dua a awu a wogayaw asi hq no ampa ara ebekūm nnua a aka hq no a wo bętease ntēm ahū nea enti a ehĩa sę wotu dua yarefo no na węhyew de sę ntuw a ęde ntini yare no ba no.

3. A dead cocoa-tree cannot bear pods, it is therefore useless to its owner—a dead cocoa-tree does cause death to other cocoa trees, it is therefore a danger on the farm—a cocoa tree suffering from root disease will be killed by the disease. Therefore Government says destroy the disease-causing fungi, and that is not a very difficult or costly thing to do.

3. Kokō dua a awu no ntumi nsow aba eyi nti ęhō nni mfaso mmā afuw wura no, kokō nnua a awu no kūm kokō nnua a aka no, eyi nti ęde amane ba afuw no so. Kokō dua a ntini yare aka no oyare no bekūm no. Eyi nti Aban sę sę nęgema a ęde kokō yare no ba no na sā ye nnye deñ nso adefwere nnim'.

4. When we find the foliage of a tree withering, and see that its roots or collar bear one of the fungi that cause root disease, what we must do is to take up the soil from the roots, take out the roots, cut them and the whole tree up into pieces and burn them all.

4. Sę yehū sę dua no ñhabañ rekagyaw na ne ntini anā n'ase no asow nea ęde ntini yare no ba no a nea ęsęsę ye ye ne sę ye yi ntini no so dote na ye yi ntini no twitwa ęné dua mū no ñhinā asiñasiñ na ye hyew ne ñhinā.

5. It must be carefully done, because if we have left any of the diseased material in the soil there is a big chance that it will grow and give the disease to healthy roots. Moreover a search should be made for the bush-stump or log which may have given rise to the disease, and that stump or log should be treated in the same manner. It will not be much use to remove the effect of disease only, the cause of the disease is the important thing to destroy.

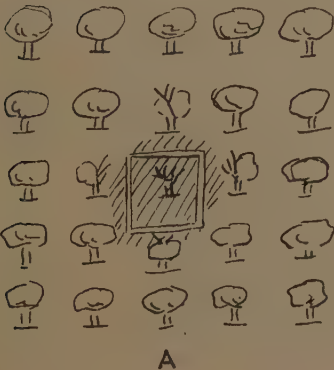
5. Eṣeṣe yeto yen boase ye no yiye efiṣe se yegyaw siñ no bi wọ fam a nea ẹbẹba ne se ebenyiñ na ẹde yare no asan ntini a ẹte apọw no. Bio eṣeṣe yefwefwẹ nnūfunū anā nnisin a ẹwọ wuram a ẹde yare no bae no na yeye enonom s̄āara. Se yeyi ade a oyare no de ba nkō họ a ẹn'de ẹhō nni mfaso pa bi, nea ẹde yare no bae ne ade titiriw a ẹse se yeyi no họ.

6. We have seen that most of the fungi which give root disease to cocoa trees can travel through the soil, either by themselves or by creeping along pieces of roots or sticks in the soil, and in order to prevent them from infecting healthy roots a 2-foot trench, over which they cannot pass, is cut round the diseased area.

6. Yẹahū se oyare no mu dodow a ẹde kokō ntini yare no ba no kyin asāse mu, ebia ẹno ara anāse ẹfām ntini anā nnua asinasin hō wọ asāse mu na s̄nea ẹbeyẹ na yeremmā ennyā ọkwañ nsañ ntini a ẹte apọw no nti wontu amōa a emu dọ beyẹ anamọñ abien ntwa fākō a oyare no wọ hō nhyia na annyā kwan antra.

7. There is, of course, a wrong way to make this trench as well as a right one and it would be wastage of time and energy to make too small a trench.

7. Ọkwañ pa nè kwanmone wọ họ a wofa so yi s̄ā k̄ā yi, ẹnẹ wuyi k̄ā no ketewā a ẹnde wosee bre ne ahōḡdeñ.



8. If the tree in the centre of the drawing A is suffering from root disease you may, or may not, find its near neighbours also attacked, which means that it is a waste of money to isolate that one tree, because the disease in the soil (shown by diagonal lines) would then be on the outside of the trench. It is far better to include even a few healthy trees within the trench as in B than to allow any diseased material to be outside the trench to infect the farm.

8. Sɛ ntini yare no akã dua a ɛwɔ mfonini A mfinimfini no a ebia wobehũ anã worenhũ nnua a ebɛn no a oyare no akã wɔn; eyi kyere sɛ sɛ wuyi dua biako no fi nnua a aka no mu a woresɛ sika efisɛ oyare a ɛwɔ asãse no mu (sɛnea nsensanee a ɛbeabea hɔ no kyere no) ebefi ɔkã no akyi. Eye korã sɛ nnua a ɛte apɔw kakra behyɛn ɔkã kon-ton-kurow no mu sɛnea B kyere no sɛn sɛ wɔbɛma nneɛma a oyare wɔm' no akofi ɔkã no akyi na ɛde yare no aba afuw no mu.
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DISEASES OF THE BRANCHES AND LEAVES.

ABĀ NĒ NHABAŅ YARE.

1. We have spoken about the importance to the cocoa tree of the roots that supply it with raw food from the soil. The tree could no more produce pods without sufficient food than a man could do any kind of work without taking his meals. But if that man had no intestines to change his food into the blood which nourishes his body he could not exist, nor could a cocoa tree which had no leaves live on the food that its roots drink in. It must have sufficient leaves to change the raw food material into plant-blood, or, to digest its food (see drawing on page 19). If some of its leaves are diseased it can perhaps struggle along like a man with a diseased stomach, but it will not have sufficient energy to produce many pods. The more leaves it has that are healthy and doing their work well, the more pods it can produce; the bigger number of leaves that are diseased, the less pods it will produce.

1. Yeakyere senea ntini hō hīa kokō dua no se ɛtwe srade fi asase mu de ma dua no. Senea onipa annidi a onntumi nnye adwuma biara no, sāara nso na dua no ntumi nsow gyēse enyā aduañ. Na se onipa nni nsōñō a ɛbedān aduañ no aye mogya a ɛyeñ nipadua no a onntumi ntra ase no, sāara na kokō nnua a enni nhabañ no nam aduan ana srade a ɛtwetwē fi ntini no mu no so nyiñ. Eɛseɛ enyā nhabañ a ɛdōso ne ɛde ama aduan no adan mogya anase yebekā se ɛdañ n'aduañ a odi. Se nhabañ no bi yare a ebia ebetumi apre ne űkwā anāse ebetumi akoñkoñ hō te se onipa a ɔyare aba ne yam; nanso ɔrennyā ahōɔden nsow aba pī. Se ɛwō nhabañ pī a ahōɔden wom' a ɛn'de etumi sow pī se ɛwō nhabañ pī a ɛyare a ɛsow aba kakra.

2. The remaining diseases in the Ordinance are those which affect either the leaves or the branches which bear the leaves, and they must be regarded as serious, because they do diminish each year the number of pods which could otherwise be changed into cash.

2. Nyarewa a aka a wōkā hō asem wō Mra no mu no ye nea ekita nhabañ nē abā a eyi nhabañ no, na ɛseɛ yehū se sā nyarewa yi ano ye den efise afe biara mu ɛmā kokō aba a ɛde sika ba no so hūa.

3. Of all the diseases given in the Ordinance none are more easy to treat than are the four which remain to be described. In the case of the first three, White Thread, Horsehair, and Mistletoe, cut off the twig that bears them and burn the lot, and in the case of other plants growing on the trees, just pull them off and burn them. Surely it is worth while taking that little trouble to help the trees to make a good crop.

3. Nyarewa a Mra no kyere no mu nea ne sa ye merew anā ennye deñ ne anañ a aka a emu nkyerekkyere mu didi so yi. Ede refa abiēsa a edi kañ a eye Hama fitā, nē tuntum yare ne Nyāñkonuru (Krāmpā) hō no nea wōbeyē ne se wotwitwa abā a ɛwō so no na wōhyew nē űhiñ. Nea ɛfa affide fofro a enyiñ wō dua so hō nso, ɔnɔpɔñ ɛno nso na hyew. Ampara eye se wohaw wo hō kakra ye sa ade yi senea ɛbeyē na dua no ɛsow yiye.

WHITE THREAD.

HAMĀ YARE FITĀ.

1. Anyone who has been on a cocoa farm where the atmosphere is very moist, and has seen numbers of withered leaves which, although they are dead, are still hanging from the twigs, as is shown on Plate 10, will recognise this disease. It is much too common in a country like this where the wealth of the people so largely depends upon the good health of their cocoa trees.

1. Obiara a wakō kokō afuw a a emu yē fōkyē mu peñ na wahu ñhabañ pī a agūañ, ewom sē awuwu de nanso edaso seisen abā no so, sēnea nsa mfonini ro kyere no behū sā yare yi. Etā ba asase a ete sē eyi a esofo (ñkrofo) no nyā wōñ sika (ahōnyāde) fi kokō a ete apow mu no so.

2. The body of the fungus which causes White Thread disease looks like a dirty white cotton thread closely adhering to branches and twigs of cocoa or cola trees. It grows rapidly until it reaches the stalk of a young leaf and then divides into many branches, which send their roots into the leaf to feed on the blood of the cocoa tree that should go to the making of new pods. But it does more than that, it kills the leaves it feeds upon; and as it exhausts them it grows forward to attack the new leaves as they are formed. Look at the top branch in the picture. There are seven dead, and one almost dead, leaves killed by this leech-like fungus, which not content with the damage it has already done is beginning to attack the little shoot marked I.

2. Oyare a ede hamā fitā yare yi ba no te sē asāwa fitā bi a aye fi a efemfam kokō nē bise nnua abā hō. Enyin ntemntem kosi sē ebedu ñhabañfro no ase na eyiye abā pī de ne ntini no hyen ñhabañ no mu twētwe kokō dua no mu nsu a esese ekoye aba no. Nanso eye nea esēñ sā, ene sē ekūm ñhabañ a edidi mu no na sē emu aduāñ sa a enyin ko n'anīm de kokō ñhabañ a grefefew fofro no. Fwē abā a ewo mfonini no sro no mu na wobehū sē emū ñhabañ asōñ awuwu, na bākō reyawu, ñhabañ a oyare a ete sē amemem a nea wasēe dedaw no anso n'ani no refi ase atoa abā ñketewa no sēnea wode agyirae yi I kyerewo mfonini no mu no.

3. The fungus produces a large number of very small mushroom fruits on the leaves it has killed, and though these fruit are hardly so big as an infant's finger-nail they each bear a number of disease-seeds. But probably the commonest way by which it increases its thieving work is by growing from one leaf to another, as is shown at the spots marked II and III on the plate. It does not matter whether the foliage of a tree attacked by White Thread is actually touching the leaves of another tree, the fungus on a fallen

WHITE THREAD

The illustration is divided into two main sections. The upper section shows a young shoot (labeled I) with several long, narrow, brown, and distorted leaves hanging from it. The lower section shows a healthy shoot with green leaves, one of which is being attacked by a diseased leaf (labeled II). A fallen leaf (labeled III) is also shown, indicating its role in spreading the disease.

I Disease attacking young shoot

II Diseased leaf giving disease to healthy leaf

III Fallen leaf giving disease to healthy leaf

leaf frequently carries the disease to other trees by being blown there by the wind as is shown at the spot marked III.

3. Oyare no fifi mmẽrẽ aba nketeńkete pĩ wọ ahabań a akũm no no so, na ẹwom' sẹ aba yi nnu akokoã boẁerẹw de nanso emu biara sow aba a oyare wọm' pĩ. Nanso ọkwan titriw a ẹnam so terẹw ne hõ mu ne sẹ ẹwĩawĩa ne hõ kọ ñhabań no so sẹnea mfonini no mu fa II & III kyere no. Sẹ dua kã a sã hama fitã yi nẽ ne ñhabań di asi no kọkã dua fofro ñhabań po a ẹnnye fẁẽ, oyare a ẹwọ ahabań a atọ fam no so no nam mframa so de yare no kọ nnua fofro so te sẹ babia wọakyerẹw họ III no.

4. The cocoa-tree is defenceless against this enemy ; consider how valuable the foliage is to the tree, and how valuable the tree is to the farmer ; is it not strange that the white-thread fungus should be found on any farm in this country ?

4. Kokõ nnua no ntumi nè sã ọtamfo yi nni asi : susu w ñhabań no hõ sẹnea ẹhõ hĩa ma okuafo no, so ẹnnye ñwonwã sẹ wohũ oyare hamã fitã yi wọ asase yi so mfuw mu ?

HORSE-HAIR BLIGHT.

HAMĀTUNTUM YARE.

1. Let us think what the long black hairs of a horse's tail would look like if a number of dead and dying cocoa leaves were entangled by them, and we shall recognise this disease called Horse-hair Blight. Plate II shows what it looks like.

1. Mommā yensusuw opoñkọ dua hō ñwī (ñhwi) tuntum hō na yebehū sẹ sẹ kokō ñhabań a awu anāse ẹrewu bẹfram' a ẹn'na yebehū oyare a wofre no hama tuntum yare yi yiye. Mfonini pōń II kyere senea ẹte.

2. The fungus which causes the damage is a close relative of the White Thread fungus, but if we call the latter a leech we should call the horse-hair fungus a python (nini) that squeezes its victims to death. The long black shining strands are the fungus body and the very small mushrooms which may sometimes be found on them are its fruits.

2. Oyare a ẹde sã sẹ yi ba no kowiewie hamā fitā yare yi na sẹ yede ẹno to amemem hō a, en'de yede hamā tuntum no yare no nso bẹto nini hō sẹ omia aboa a wakyere no no kosi sẹ owu. Hamā tuntum hanāhanā no ne oyare no ahamā na mmere nketenkete a ẹto dabi a wohū wọ se no ne emu aba.

3. Now the leaves of a cocoa tree cannot do their work unless they have plenty of air and light, any more than a woman could cook food without fire, and the damage done by horse-hair to cocoa trees is caused as much by entangling the leaves together, so that they get neither sufficient air nor light, as much as by their ultimate death.

3. Afei kokō dua so ñhabań no rentumi nnye n'adwuma yiye gyese enya mframa ne hanń pi senea obea renntumi nnōa aduan gyese wanya ogya ansā no, ose a hama tuntum yare de ba kokō dua so no, nea enam so ba ne ọtōa a ẹtōatōa kokō ñhabań no ñhinā na ẹmmā ennya mframa ne hanń a ese no, awiei no ede owu ba.

4. The fungus is a bad enemy to cocoa, but unlike the White Thread fungus it is only occasionally affixed to the leaves and twigs, and therefore is more easily removed.

4. Oyare yi ye kokō tamfo kese nanso entese Hamā fitā yare no, ẹto dabia ẹfam ñhabań no ne abā hō a enti ne yi nnye yi nā.

HORSE-HAIR BLIGHT



PLATE 12.
LORANTHUS PARASITIC ON COCOA



LORANTHUS (MISTLETOE).

NYANKŌNURU (KRĀMPĀ).

1. All of the foregoing diseases are caused by the small plants we call fungi, but this one, as everybody knows, is caused by a plant which has green leaves, and flowers as well as fruit.

1. Nyarewa hrow a edi anim no nhinā nea ẹde ba ne afide nketenkete bi a wofre no ntuw na eyi de seneā obiara nim no ne ede ba ne afide bia ne nhaban ye ahabamonō su a egu nfwiren na esow aba.

2. Mistletoe cannot be considered as an honest plant that works for its own living, because it makes use of cocoa, and many other kinds of trees to supply it with food ; it is a parasite like the ticks are on cattle.

2. Wonntumi n̄nka se Nyankōnuru (Krāmpā) ye dua pa a ẹde ne hō, efise kokō ne nnua pī mu na etwētwe nsu fi. Edidi nnua hō seneā sōmmore ye ntoteboa hō no.

3. The upper picture on Plate 12 shows a young mistletoe plant which has established itself on a young cocoa branch ; you will notice that the cocoa branch is healthy, and that the parasite has no roots connecting it with the soil, it must therefore depend on the roots of the cocoa-tree to supply it with its raw food material from the soil. As the mistletoe grows it requires more and more of this food, and consequently the end of the branch on which it grows gets less and less, and the result which must happen is that the branch dies, as is shown in the bottom picture. If we cut through that part of the mistletoe which ought to be its root, we shall see clearly how the wood or gullet of the parasite is joined to the wood or gullet of the cocoa tree, and how it is starving the end of the branch with its leaves, and perhaps pods, to death. Now whilst the mistletoe is taking away from the tree its raw food it is doing nothing for the tree in return ; it has green leaves which digest the raw food stolen from the cocoa-tree, but it uses up the plant-blood so made for its own purposes only, and so it kills the branch on which it grows.

3. Yefwe mfonini 12 no soro a yehū Nyankōnuru (Krāmpā) a agye agua wō kokō aba a ennyini a ewo ahōḡden so, na aṣekwa no nni ntini a eso asase mu enti etwa na etwa se ẹdañ kokō ntini na ẹde nsu a enyā fi asase mu no yen no. Nyankōnuru no renyin no efwefwe s̄a aduan yi pī na nea ẹba ne se abā a enyin wō so no ase k̄osi s̄ua dā na nea efi mu ba ne se dubā no wu seneā yehū wō mfonini a edi ase no mu. Se yepae Nyankōnuru no fā a ẹse se eye ntini no mu a yehū pefē se ne dua anase menewa a ẹda mu no n̄e kokō dua anase menewa no abom' na ẹde okom rekūm kokō no abā n̄e ne nhabanmpon'abano. Afei bre a Nyankō-

nuru (Krāmpā) yi regye dua no mu nsu yi ɛnnye fwē mmā dua no ɛwɔ ahabaŋ mōmōnō a edi aduan momōnō a ɛwia fii kokō dua no mu no na ɛsiane sɛ sã afifide mu nsu anã srade no ɔde ye naŋkasa hō ade nti, ekūm, abã a enyiŋ wɔ so no.

4. Mistletoe is a thief who steals from the cocoa tree and consequently from the farmer; if the farmer is wise he will cut off all branches which are occupied by this thief, and cast him into the fire before the tree is completely taken over. Mistletoe, having no other work to do, produces a large number of red flowers, which in their turn give rise to fruit containing seeds. These fruits are eaten by birds, and the seeds, which adhere by their stickiness to the birds' beaks, are carried to the branches of other cocoa trees and rubbed off. In a short time the seeds germinate and, instead of producing an honest hard working root-system, they form a sucker which penetrates the wood or gullet of the cocoa tree, and the thieving parasite begins to destroy the tree.

4. Nyaŋkōnuru (Krāmpā) ye owifo a owia kokō dua no mu ade na enti owia okuafo no ade. Sɛ okuafo no nim nyansã a obetwa abã a owifo yi gye afa yi na ɔde ato gyam' ahyew ansã na wagye dua mu no ŋhinã. Nyaŋkōnuru a onni fwē ye no gu ŋfwireŋ ŋkɔkɔ pī na ɛno nso asaŋ asow aba. Sã aba yi nnōmã di, na aba a emū nsu ye twã no ka nnōmã no ano na wode kotwītwiw kokō nnua hō. ɛnkye kora na aba no afifi na sɛnea aŋka ɛbɛbrɛ hō agye ntini asase mu no ɛkɔfām dua no hō fwirew dua no nè emu furu mu na afifide wifo yi fiase sɛɛ dua no.

5. No real cocoa farmer ought to pass by a cocoa tree bearing mistletoe without killing the thief. Cut off the branch that bears it and burn it as it deserves.

5. Obiara a obu ne hō sɛ kokō kuafo pa no ɛnsɛ sɛ ɔtwa kokō dua a Nyaŋkōnuru siso hō kɔ a ontɔre sã wifo yi ase. Twa bã a esi so no na nea ɛsɛ ara ne sɛ wo hyew.

EPIPHYTES ON COCOA TREE



EPIPHYTES ON COCOA TREES.

AHUM NÈ AHAM.

1. The last of the injurious pests to which the Ordinance refers are called epiphytes, because they are plants which grow not in the ground but on the surface of other plants. They differ from mistletoe because they do not take anything but support from the tree on which they grow. None of them has a sturdy body to lift it up into the air and light, and so they seek a tree like the cocoa to raise them out of the deep shade on the surface of the ground.

1. Óyare bone a edi akyiri Mra no kã hõ asem no wofreno Ahum-nè-Aham efise eyẹ afifide a ennyiñ wọ asase so na mmom enyiñ wọ afifide binom sq. Esonō ẹno na ẹsonō Nyañkōnuru (Krāmpā) efise ennye bribiara mmfi dua no ñkyen. Wonni dua a esi pim a etumi mã so kọ ahum mu nè hann mu enti wọfwefwẹ dua a ete sẹ kokō na amã wọñ so afi onwini mu wọ asase ani.

2. There are many different kinds of plants, which have this nature, to be found in a cocoa farm and in the bush ; eleven different ones are shown on Plate 13. They take in nourishment from the bits of dead vegetable matter which occur on the rough bark of the tree, and from the moist atmosphere which surrounds them.

2. Afifide hrow pī wọ họ a ekura eyi su a wo hũ wọ kokō mfuw nè wuram'. Ẹnam ahorow dubiako wọ mfonini 13 no mu wọfwetwẹ nsu fi afifide a awu a ẹwọ nnua hõ abõñ nè foñwini a atwā hõ ahyia no mu.

3. Epiphytic orchids bear flowers, but mosses and ferns which are also epiphytic do not.

3. Ahum-nè-Aham no sow ñfwiren nanso dua hõ nwi nè mmeyā (aya) a ẹyẹ oyare koro no ara bi no de ennu ñfwiren.

4. Now these epiphytes do not take food from the cocoa tree as parasites do ; they never get inside the body of the cocoa tree as do the fungi which we have been talking about ; and the cocoa-tree is strong enough to bear the weight of more than would have room to grow on it. What harm can they do ?

4. Afei sã soro nnua yi nnye nsu mfi kokō dua no mu sẹ awekwa anāse Nyañkōnuru yẹ no, ẹnnhyen kokō dutań no mu senea oyare a yeaka hõ asem no yẹ no, na kokō dua nso wọ ahōgden senea ẹsẹ a ebetumi asoa dodow ara a eyẹ duru kyen nea ebetumi annyin wọ so. Bone ben na eyẹ ?

5. A cocoa tree has no lungs such as a man has, but every part of its body, roots and stem, twigs, leaves and branches, have to breathe as man does through his nostrils, and all over the cocoa tree's body there are very small nostrils for this purpose of taking in air. We can kill a tree by so filling the soil with water that the nostrils occurring on its roots cannot get water, and these epiphytes not only clog up the nostrils on the stem, branches and leaves, but they also require air and so use up the air that belongs to the plant; they tend to suffocate that part of the plant on which they grow.

5. Kokō dua nni hurututu sẹ onipa, na dua no fã biara ntini, dutan, abã nè ñhabañ gye ahōme senea onipa gye fa ne fwenēm' no, na dua hō ñhinā wọ ntokuru a ẹte sẹ fwenē a wode gye mframa. Ye tumi nam nsu pī a yede gu dote mu no so siw ntini no mframa-gyebea kwañ de kũm dua no, na annyã nsu, Ahum-nè-Aham yi nnsiw dutan, abã ne ñhabañ no mframagybea kwañ ñkō, na esiane sẹ worepẹ mframa nti wotwē nea eyẹ afifide no de no na afifide a ahum-nè-aham yi nyiñ wọ so no hō hĩa no.

6. Then all green parts of the cocoa tree must have plenty of light in order to digest the raw food sent up by its roots, and the presence of epiphytes does diminish the supply of light for the cocoa tree. So that epiphytic orchids, ferns, and mosses do a considerable amount of direct harm to the cocoa tree; moreover, by weakening the health of that part of the tree on which they grow they make the way easy for disease-seeds to enter.

6. Afei kokō dua nofã a eyẹ amonō sẹsẹ enyã haññ pī senea ebeye na na ebetumi ayam aduan monō a ntini no de aba no na ahum-nè-aham no hũañ haññ a sẹsẹ sẹ kokō dua no nyã no so. Enti ahum-nè-aham, mmeɣã nè dua hō-ñwī yẹ kokō dua no bone pī, titiriw no esiane sẹ ema ahō-omerew ka dua no fã a neɣma no gu ho nọ nti emã oyare nyã okwan hyen mu.

7. All epiphytes should be torn from the tree and either burnt or buried—a very easy operation.

7. Eṣẹ sẹ wotetew ahum-nè-aham no ñhiña fi kokō dua no so na wohyew anã wo funu fam de hye, mu. Eyi yẹ adwuma ketewã bi a ennye yena korã.

Cocoa has been a good friend to the farmer. It cannot relieve itself of disease. Disease robs the farmer of his money. It is an easy matter to relieve cocoa of its disease.

Why then allow any disease on your farm?

Kokō ayē okuafo adamfo pa. Enntumi nnsa ne hō yare.
Oyare wia okuafo sika. Kokō yare yi nnye sa nã. Enn'de
ēden nti na womã oyare ba wafūm ?

Keep your cocoa trees in good health by cultivation and they will repay you. Allow your cocoa trees to die of disease and you will have to find other means of gaining wealth.

Mã wo kokō dua no nyã ahōden dā na yē hō adwuma yiye
na wobenyã mu mfaso. Mã wo kokō nnua no nyare na
enwu na wobegye okwan kō a wobefa so anyã sika.

THE GOLD COAST AGRICULTURAL
AND COMMERCIAL SOCIETY.

This is a semi-official body of which the Director of Agriculture is *ex-officio* Chairman. The Society publishes a quarterly journal obtainable from the Secretary, Accra, (P.O. Box 206, Accra).

PUBLICATIONS OF THE DEPARTMENT.

LEAFLETS.

*1. Cotton	..	..	..	..	..	..	..	Nov.,	1924.
*2. Corn Smut	..	..	..	..	..	..	..	Dec.,	1924.
3. Notes on Cocoa and Corn Smut Posters	..	..	..	..	..	..	..	Dec.,	1924.
4. Diseases of Corn	..	..	..	..	..	..	..	Jan.,	1925.
*5. Notes on the Cultivation of European Vegetables	..	..	..	..	..	..	..	April,	1925.
6. White spot on Cocoa	..	..	..	..	..	..	..	June,	1925.
7. Notes on Oil Palm Planting	..	..	..	..	..	..	..	April,	1926.
8. Address to Chiefs (Plants Injurious Pests Ordinance)	..	..	..	..	..	..	..	July,	1925.
9. Oil Palm Planting	..	..	..	..	..	..	..	Sept.	1926.
*10. Corn Storage	..	..	..	..	..	..	..	Oct.,	1926.

POPULAR POSTERS IN COLOUR.

Preservation of the Oil Palm (Black print).

- No. 1. Why you should get rid of White Thread.
 " 2. Treat your cocoa trees well.
 " 3. What Sankonnabe or Akate does.
 " 4. Thrips is your enemy.
 " 5. Cocoa Mosquitoes.
 " 6. Do not cut down all the Forests.
 " 7. Forests are good for cocoa.
 " 8. Remove sick cocoa pods quickly.
 " 9. Black pods are your enemy.
 " 10. $\frac{1}{2}$ is better than $\frac{1}{4}$.
 " 11. Foolish farmers neglect disease.
 " 12. Injury some insects do.
 " 13. Corn Smut.

BULLETINS.

No. *1.	Control of Termites or White Ants in Buildings	..	..	Oct.,	1925.
" 2.	Rainfall of the Gold Coast	..	..	Jan.,	1926.
" 3.	Preliminary Study of the Life history of Sahlbergella	..	..	June,	1926.
" 4.	Yields of Cacao on Experiment Stations	..	..	April,	1926.
" 5.	Collar Crack of Cacao	..	..	Jan.,	1927.
" 6.	Economic Significance of Cacao Pod Diseases	..	..	Feb.	1927.
" 7.	Year Book of the Department of Agriculture, 1926	..	..	Feb.	1927.
" 8.	Plantation Oil-Palm Industry in the East	..	..	Feb.	1927.
" 9.	Sugar, Snow-rubber, Quinine and Nipa Palms in the East	..	..	Oct.,	1927.
" 10.	Fungi affecting Gramineous Crops	..	..	Oct.,	1927.

* Out of print.